

IN THE SPECIFICATION

[0053] Figure 19 illustrates the disconnect switch 1902 and the fuses 1906. The disconnect switch 1902 and the fuses 1906 are illustrated as the switch 204 and fuses 206 in Figure 2. The disconnect switch 1902 is secured to a support plate 322, which is located in the mid-section of the cabinet 302 (illustrated in Figure 3). The bottom portion of the lower disconnect switch contacts 2206 (illustrated in Figures 22 and 23) are the upper fuse holders 1904. The lower fuse holders 1908 are similar to the upper fuse holders 1904. The lower fuse holders 1908 are electrically connected to the contactor. The fuses 1906 are conventional fuses that provide overcurrent protection. Although Figure 19 shows only a set of three fuses 1906A, 1906B, and 1906C, in various embodiments, either six or nine fuses can be used, with two or three fuses 1906 in parallel, respectively. Two fuses 1906 in parallel use a lower two-fuse holder 2010 as illustrated in Figure 20A. Three fuses 1906 in parallel use a lower three-fuse holder assembly 2010' 2022 as illustrated in Figure 20B. This configuration of fuses 1906 permits removal and replacement of the fuses 1906 without removing, or withdrawing, the contactor or disconnect switch 1902. Additionally, the operator of the disconnect switch 1902 is interlocked with the contactor door 304 such that the door 304 cannot be opened and the fuses 1906 or other high-voltage components cannot be accessed unless the disconnect switch 1902 is in the open position.

[0054] Figure 20A illustrates a two-fuse holder 2010, such as the lower fuse holder 1908, which includes a pair of fuse clips 2006A and 2006B and an outer shroud 2004. Figure 20B illustrates a top view of the fuse holder 2010 illustrated in Figure 20A and a single fuse holder 2020, which is secured to the fuse holder 2010. The shrouds 2004, 2014 of the lower fuse holder 1908 include mounting holes 2022A, 2022B, 2022C (collectively 2022) for securing the shrouds 2004, 2014 to a support plate 1912. The shrouds 2004, 2014 of the upper fuse holder 1904 are cast with the lower disconnect switch contacts 2206 (illustrated in Figures 22 and 23) and do not have mounting holes 2022.

[0056] The shroud 2004 is formed of a single casting of aluminum, plated copper, or other conducting material and has rounded surfaces, which minimizes the electrical stress and reduces corona. The shroud 2004 surrounds the sides of the fuse clips 2006 and, for the lower fuse holder 1908, has a side opening 2008 for the fuse 1906 to be inserted into the fuse clip 2006.

The upper fuse holder 1904 does not require the side opening 2008. In one embodiment, illustrated in Figures 22 and 23, the upper fuse holder 1904, illustrated as fuse holders 2206A, 2206B, 2206C, includes rounded slots 2232A, 2232B1, 2232B2, 2232C1, 2232C2 through which the engagement of the fuse 1906 can be inspected and to provide access to the fuse clip 2006.

[0057] Figure 20B illustrates a three-fuse holder assembly 2010' 2022 including a two-fuse holder 2010 attached to a single fuse holder 2020 by a fastener 2032. Those skilled in the art will recognize that the fastener 2032 can be a bolt 2032 and nut 2034, a rivet, or other type of fastener without departing from the spirit and scope of the present invention.

[0058] Figure 21 illustrates a housing 2104 of the disconnect switch 1902 and a switch illuminator 2150. The housing 2104 includes a frame window 2108 surrounding a view window, through which the internals of the housing 2104 can be viewed. The disconnect switch 1902 includes an operator connector 2102, into which an operator handle fits. Rotating the operator handle, and the operator connector 2102, operates the disconnect switch 1902, which is shown schematically in Figure 2 as the disconnect switch 204. The line-side connection is made directly to the bus connection tabs 2302 protruding above the housing 2104. This direct connection eliminate risers or other extraneous electrical connections to the disconnect switch 1902 and serves to reduce potential heat generating connections. The line-side bus is shown as the bus 202 on Figure 2.

[0059] Figure 22 illustrates the internals of the disconnect switch 1902 in the closed position, including the upper switch contacts 2204 2202, the switch blades 2204, the operator shaft 2212, and the lower switch contacts 2206 2314. Figure 22 shows an embodiment of a lower switch contact 2314A attached to 2206A having a single fuse holder 2020 (also shown on Figure 20B). Figure 22 also shows an embodiment of the lower switch contact 2314B and 2314C attached to 2206B and 2206C having a two-fuse holder 2010 (also shown on Figures 20A and 20B). Figure 22 shows the two embodiments for illustrative purposes because, typically, only one embodiment would be used in a controller 102 at a time. Figure 23 illustrates a cross-section view of the internals of the disconnect switch 1902 illustrated in Figure 22, with the addition of the grounding stabs 2324 protruding from the grounding bar 2322, which grounds the

load-side of the disconnect switch 1902 when the switch 1902 is in the open position. The grounding stabs 2324 and the grounding bar 2322 are not illustrated in Figure 22. The illustrated embodiment of the disconnect switch 1902 has cast parts to minimize the number of components and reduce the number of heat generating connections.

[0061] Each lower switch contact 2206 includes the lower contact 2314, is formed with a mounting pad 2222, and an upper fuse holder 2206. The lower switch contact 2314 2206 is formed from a conductive material. The mounting pad 2222 has openings 2224 used to attach the lower switch contact 2314 2206 to the housing 2104. Those skilled in the art will recognize that any of various types of fasteners can be used to secure the lower switch contact 2314 2206 to the housing 2104 without departing from the spirit and scope of the present invention.

[0062] Each switch blade 2204 includes two flat bars 2204' and 2204'' that sandwich the upper contact 2304 and a lower contact 2314. The switch blades 2204 are formed from a conductive material. The operator shaft 2212 is connected to the operator connector 2102 outside the housing 2104 and to the switch blade holders 2214 inside the housing 2104. Each switch blade holder 2214 contains a pair of parallel switch blades 2204' and 2204''. Internally, the switch blade holders 2214 include springs that force the switch blades 2204 against the upper contact 2304 and the lower switch contact 2314 such that electrical continuity is established between the upper switch contact 2202 and the lower switch contact 2314 2206 when the disconnect switch 1902 is positioned in the closed position illustrated in Figure 22.